The impact of local ICT initiatives on social capital and quality of life

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This paper reviews the evidence for the effects of local ICT initiatives ('community networks') on neighbourhood social capital and quality of life and has been developed from the public SOCQUIT D11 report (Anderson et al, 2006).

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1 Introduction

Since the early 1990s, there has been considerable enthusiasm for the use of Information Communication Technologies (ICTs) to foster local community ties through education, job opportunities, encouraging community activities and increasing general sociability within a local area. More recently the policy agenda with respect to local ICT initiatives is becoming substantially clearer. At the European level a recent Commission Working Paper reiterates the importance of the local implementation of employment strategies and points out that ICT based initiatives should be no different (Commission of the European Communities 2005). They conclude that:

> "The recent Council Resolution on building social and human capital in the knowledge society specifically calls on Member States "in the area of social cohesion to promote the positive role of the social economy, of local development initiatives and of local communities in social capital building". The local dimension is thus a key aspect of e-Inclusion policy…European or national inclusion policies certainly have a key role but without complementary strong local initiatives these are doomed to fail…. Community networking projects – such as Local Nets - bring new opportunities for both digital and social inclusion – as well as for social capital building. They represent a model for designing policy interventions aimed at fostering "participation of all"…. Good practices and case studies provide the empirical evidence for the social impact of Local Nets…eInclusion measures should build upon this trend and target local and community based development with an holistic approach" (Commission of the European Communities 2005)

Of note here is the notion that policy interventions should follow from good practices and case studies. As we will see both that 'policy intervention', which by its nature is generally 'top-down', may not work and that there are very few long term case studies or impact assessments which can help.

The same focus on interventionist local action can be seen more parochially in a number of national strategies. For example the UK Digital Inclusion Strategy (Cabinet Office 2005), amongst a range of other actions, looks to build on the pilot UK Online Centres[1]:

> "government should focus its investment on communal Internet access points, through schools and online centres, with a focus on reaching hard-to-reach groups and providing enhanced support at such locations" (Cabinet Office 2005)

However what is noticeable about the UK strategy is that the focus is on centrally provided public internet access points set within skills and training centres. As we will see these kinds of initiatives are prone to a range of problems that make their long-term sustainability doubtful. In this report we introduce a distinction between these kinds of top down approaches and grassroots initiatives that are not 'policy interventions' but are locally-owned responses to perceived or actual need. Whilst the Commission Working paper alludes to such actions, the UK paper does not and we intend this report to compare and contrast these approaches in order to highlight their relative values.

The optimism of the 1990s and indeed of these recent policy statements may now be fading, with researchers increasingly questioning the types of opportunity that a community network offers, and the types of social change that it can facilitate. This report examines the evidence for both long and short term effects of community network initiatives on social capital and quality of life, in order to guide policy recommendations for the implementation and maintenance of such initiatives.

We have found that detailed empirical research into the effects of these initiatives is scarce, especially over the long term. This may be in part because it was assumed that their effects would be positive, which may have led to a relative lack of assessment. It has been assumed that computer mediated communication can support face-to-face ties, thus halting the decline in social capital highlighted by Putnam (2000). Also, addressing the so-called 'digital divide' is a prime concern for many governments and community initiatives were widely seen as one of the simplest ways to do this. As a result there may have be some reluctance to examine their effects in more detail.

In a search for evidence this report therefore has had to examine material from a wide range of countries, both inside and outside the European Union, in order to draw a rich picture of the effects of networked community initiatives. This approach is also useful for comparative purposes, that is, it allows us to hypothesise about the possible effects of different cultural influences, such as style of government, the

[1] ICT centres in the most deprived 2000 local areas of the UK

history of private enterprise in the area, social norms and attitudes to community. Community initiatives take place in a broader context, and by understanding these contexts we can help to ensure more effective application of community ICTs.

2 What do we mean by local ICT initiatives?

First we need to identify what we mean by local, and ICT initiatives. There has been increasing interest in the study of community interactions with ICT and this has resulted in a broad variety of terms and associated meanings to describe the activities undertaken.

Community network	(Schuler 1994; Horrigan 2001)
Network community, networked community	(Carroll and Rosson 1998; Day 2001)
Place based community network	(Blanchard 2004)
Place based virtual network	(Blanchard 2004)
Community-based ICT initiatives	(Liff 2004)
Local Net	(Schuler 1994)

Figure 1: Examples of terms used to describe local ICT initiatives by selected authors

A proportion of the research literature discusses social capital and ICT drawn from general internet studies as well as specifically place based research (O'Neil 2002). However there has been an increasing trend towards considering ICT initiatives as part of existing social interactions rather than separate, purely online virtual communities of interest. Despite the ability of the internet to offer "the death of distance" (Cairncross 1997), Willmott noted that "local community undoubtedly matters in the lives of the great majority of people in Britain" (Willmott 1986). Place still matters: ICTs may "reduce the friction of space (but) not the *importance* of place" (Hampton 2004).

ICTs can be viewed as part of a complex ecology of communication tools that enable local social interactivity: "the Internet […] is a tool for maintaining social relations, information exchange, and increasing face-to-face interaction, all of which help to build both bonding and bridging social capital in communities" (Kavanaugh 2001). Haythornthwaite (2005) notes that stronger ties are characterised by broader media usage and ICT initiatives may play a significant role in developing and sustaining local social ties. There has been a shift to considering ICT usage as integrated within the broader "media ecology" that people use to undertake social interactions within their local neighbourhoods. Research has been carried out in a broad range of communities of locality from clearly defined housing developments (Turner and Pinkett 2000; Hampton and Wellman 2001; Skyva 2002; Foth 2005; Gaved and Mulholland 2005) to rural villages (Liff 2004; Corbett, Annison and Cobb 2005) and large towns and even regions (Carroll and Rosson 1996; McQuillan 2000; Williams 2005). Common to all of these initiatives is the shared physical locality as a defining characteristic of social engagement between users of the ICT.

This raises the questions about how to define 'local' and which 'communities' are being investigated. Key issues include:

- Definitions of community
- Projects or initiatives?– framing of ICT developments within communities
- Ownership – where control lies
- Geographical reach – are there boundaries that define 'local initiatives'?

2.1 Definitions of 'community'

The definition of community has been contested within sociology from at least Tönnies onwards (Tönnies [1887] 1957). Gellner (1983) notes that we talk of regions, nations, even groups of nations as being 'communities'. Willmott (1986) offers three definitions of community:

- Community of locality: defined by where we live, our neighbourhood
- Community of attachment: a measure of the level of interaction with others, and the sense of identity
- Community of interest: a group of people with common interest

Crow and Allen (1994) note that "sense of community" is likely to be strongest when two of three of Willmott's types of community are present. The optimal size of a community has been disputed: the UK Government Wired Up Communities project defined community as "those living in relative proximity and made up of no more than 4000 people" (Devins, Darlow, Petrie and Burden 2003). Dunbar (1993) suggests that humans may have a cognitive limit - approximately 150 people - with whom an individual can maintain stable relationships and his results are replicated in studies of social network size. This offers fundamental limits to the number of persons within a geographical area that a single individual can 'know'.

2.2 Projects or initiatives?

ICT developments within community settings have been variously described as 'projects' or 'initiatives'. We follow Day and Cupidi and argue that ICT developments should aspire to be 'initiatives' rather than 'projects'. 'Initiative' emphasises the need for ICT within community to be developed as "an integral part of community infrastructure" and that the "short-term nature of the project mentality is considered detrimental to the aim of social sustainability" (Day and Cupidi 2004). A 'project' implies a development that has a closed timescale, defined goals and limited resource funding, whereas an initiative allows for open ended development and ongoing maintenance.

Many examples of local ICT research tend towards a 'project' format and the data collection methodology reflects this approach: in very few cases are longitudinal studies or revisiting of communities planned. This affects the following literature review; for the most part we have been unable to identify long term consequences of the majority of ICT interventions.

2.3 Issues of ownership

Doug Schuler has suggested that "A community network is designed, used, administered, and owned by the community" (1996)[2] however in many cases the control over the development of the ICT initiative may be held in partnership or outside the user community. Control and ownership may be exerted by:

- The host community (and this can be contested and also evolve over time) – what we term endogenous or 'grassroots' initiatives
- An individual within the community who purports to represent the community (e.g. a village website set up by one person with their vision of their neighbourhood)
- A partnership of stakeholding organisations and individuals
- An external body: for example government and/or university – what we term exogenous initiatives

Each of these may influence how the ICT initiative develops and how successful and sustainable it becomes in the long term.

The issue of ownership is under discussion amongst practitioners themselves, as well as for external researchers as evidenced by the ongoing debate at the Community Broadband Network (CBN) website[3]. Local ownership or management is seen as a significant aspect. But we include externally funded but locally managed developments as well as partnerships between local organisations and external funders. A current focus of discussion in CBN is how to categorise 'commercial ICT initiatives': what is the boundary between an ethically minded commercial ICT initiative that supports a specific community or tailors its product to a specific locality, and a 'local ICT initiative' that grows to encompass several localities, and perhaps has the opportunity to consult/ provide ICT for a distant locality? In many instances there are partnerships between groups and it may not be clear-cut as to where ownership or control lies. There may be government, commercial and/or local community interests all involved in short or long term arrangements. Ownership may change over time: government initiatives may be handed over to local groups, e.g. Cybermoor – one of the Wired Up Communities projects (Devins, Darlow, Petrie and Burden 2003) or the local community may try to maintain a deceased commercial initiative, e.g. Netville (Hampton 2003).

2.4 What constitutes a local ICT initiative?

What constitutes a local ICT initiative?

- The provision of a network infrastructure such as shared satellite connection or broadband connections

[2] http://polaris.gseis.ucla.edu/pagre/tno/january-1996.html)
[3] http://domain875611.sites.fasthosts.com/CBN/index.php?option=com_simpleboard&Itemid=31&func=view&id=317&catid=21

- Digital content: does a village website count as a local ICT initiative?
- Does it need to be a combination of both infrastructure and content?
- Training? Support? Skills sharing? Physical location?

A 'community network' may merely mean a village website (Liff 2004), or collaborative provision of internet access to a locality. Within this report we consider the spectrum of possibilities but focus on initiatives that that actively engage with assuring infrastructure development, services based on this infrastructure, and ongoing social and technical support to the community.

3 Social Capital and Quality of Life in the context of Local ICT initiatives: Framework and approach

Of interest here is the way in which such initiatives increase or maintain social capital and aspects of quality of life. More specifically, and in line with the literature reviewed in the recent SOCQUIT report (Anderson, Dries, Gaved, Heres, Mooy, Stoneman and Thomas 2006), we are interested in the role of these initiatives in mediating bridging and bonding capital and in contributing to (or potentially reducing) objective and subjective aspects of quality of life.

Figure shows our conceptual starting point. We hypothesise that local ICT initiatives will have an effect on bridging capital and on bonding capital and that these effects will filter through to aspects of quality of life. We have given some illustrative labels as examples. Note also that we except social capital to have a feedback effect on ICT initiatives. For example bridging capital may be exploited to access technical knowledge and support whilst bonding capital may be exploited to encourage usage by kin and others. In each case this will predominantly flow form the social capital of the early adopters of the initiative.

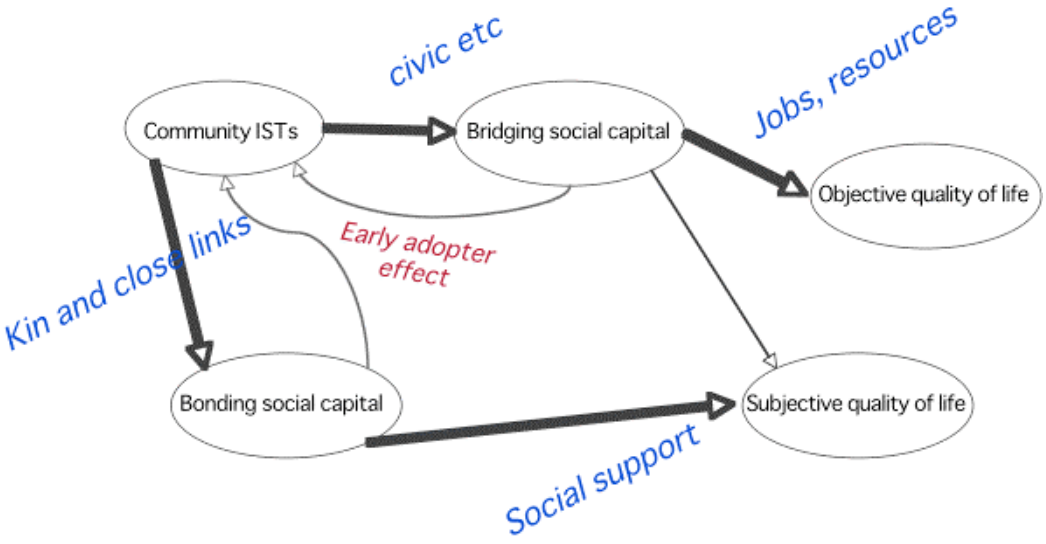

Figure 2: SOCQUIT conceptual model as applied to local ICT initiatives

This kind of analysis has certain requirements that turn out to be infrequently met in the kind of initiatives under study. It requires that initiatives assess their affects not only in terms of resulting orientation towards ICTs or penetration levels in the short term but also the longer term effects on social outcomes within the community 'exposed' to the initiative.

As we will see there have been very few high quality attempts to do this possibly due to initial high enthusiasm for these initiatives or, more likely, to their relatively short-term schedules. Anecdotally there would appear to be less reflective practice on the part of grassroots initiatives – perhaps because there is no perceived need to analyse impact in a structured manner: the main task is to ensure the network itself runs, and impact is judged by the activists in the community often on qualitative feedback gathered informally. Exogenous initiatives/ projects are often audited and hence are more likely to be required to analyse their effects to satisfy funding sources, also 'analysing impact' may be one of the goals of the interventions; this is rarely a goal of grassroots initiatives although a number of researchers are now study and re-visiting some initiatives(Skyva 2002; Gaved 2003; Davies 2004). The few that do are usually academic intervention projects ('action research') such as the Blacksburg Electronic Village .

The analyses that do exist are often too shallow and too soon. As an example they have included basic surveys only 6-12 months after initiation and in some cases the technology was not yet even in place when the 'assessment' was carried out (Devins, Darlow, Petrie and Burden 2003).

After exhaustive searching of both the academic and grey literatures it became apparent that there is no primary impact assessment data that has been made available for secondary analysis, be this survey or interview based. Our method therefore was to build on recent reviews such as that of Loader and Keeble and to include recent published/unpublished 'impact assessments' from the available grey literature (such as EU/Government funded initiatives) as well as interviews with longer-term initiative such as Cybermoor, UK – one of the UK's Wired Up Communities (Devins, Darlow, Petrie and Burden 2003).

4 A short history of local ICT initiatives

Community interaction has been a driver of research and development since the inception of the internet itself: in 1968 Licklider and Taylor envisaged "communities not of common location, but of common interest" (1968). From the early 1970s initiatives developed to extend ICT facilities to geographical localities, driven by a combination of communitarian ideals and economic concerns that segments of the population should not be 'left behind', unable to utilise the new communications technologies. Researchers have argued that participation through community interaction offers an effective method for individuals to learn new technologies (Lave and Wenger 1991; Mäkinen 1999) and we can find examples of community ICT initiatives from the beginnings of the internet to the present.

The earliest ICT community initiatives focussed around communities of interest in commercial and academic environments, the first places to gain internet access and a desire to outreach into community environments (Levy 1984). From the early 1970s, computers were connected to telephone lines as shared bulletin board systems (BBS) and were used to support localised communities of interest: possibly the first was the Berkeley Community Memory (Farrington and Pine 1996) followed by such groups as the Cleveland Free-Net (Stallings 1998) Santa Monica PEN and the WELL (Figallo 1993; Rheingold 1994; Beamish 1995). BBS's tended to be locally based phenomena due to the pricing structure of phone calls (long distance calls were very expensive, while local calls were lower cost or even free) and often encouraged face to face meetings and community action. Some BBS's became focal points for international cooperation to support local activism, such as Radio B92 - collecting information under adverse political conditions in the former Yugoslavia, sent via the internet to Amsterdam, and then beamed back to local radio stations and individual listeners," to VHS cassettes . . . screened in town squares, clubs, and cáfes" (Matic 2004).

The Amsterdam based 'de Digital Stadt' (DDS) is an example of a high profile BBS evolving as the internet itself changed. DDS started in January 1994 as a ten week community BBS, developed into a large scale community resource, and ultimately became a commercial service provider. Inspired by the US and Canadian community networks movement, DDS "evolved from an amateur, low-tech, non-budget grassroots initiative into a fully professionalised, technology and business driven organisation" (Lovinks and Riemens 2000), from non-profit organisation funded by a variety of sources, including local council and EU sponsorship into a commercial ICT venture, with up to 160,000 users at its peak in 2000. In 1994 it was one of a very limited number of ways of accessing the Internet for residents of Amsterdam, but as time passed more options became available and DDS found itself struggling to compete with other commercial providers. As the original Amsterdam town council and EU subsidies ran out the organisation turned to contract work and commercial sponsorship, and concentrated less on the community building and support which had

attracted many of its original users. This eroded the user base and sense of community, and DDS was eventually sold off in 2001.

In 1994 Doug Schuler estimated that there were over a hundred North American 'community networks' either operational or in the planning stages (Schuler 1994). These pioneers had focussed attention on the possibilities of ICTs as a growing force within the new "information society" (Castells 1996), and helped focus political attention on the effect the internet was having across society. Community networks gave many people their first opportunity to access the internet and offered a shared experience and practical support. In the mid 1990s many were still operating via BBS's and early networking tools, but generally they moved to the newer and more user friendly world wide web based services, and many struggled to maintain their role as it became easier for the public to gain internet access through a wider variety of providers.

Governmental enthusiasm to connect industry and society to the new "information superhighways" (National Information Infrastructure 1992) raised the spectre of an increasing gap in access to the new information and communication technologies (Anderson, Bikson, Law and Mitchell 1995). An early analysis of inequalities of access to ICT was the 1995 US National Telecommunications and Information Administration (NTIA) report 'Falling Through the Net: A Survey of the Have Nots in Rural and Urban America' (National Telecommunication and Information Administration 1995). While exploring whether the US government's goal of ensuring universal access to telephones had been achieved, the NTIA extended its research to study penetration rates of computer and modem ownership. The 1995 report identified that "access to the computers and networks may be as important as access to traditional telephone services". This survey was followed up with a second survey three years later (National Telecommunication and Information Administration 1998). The resulting report: 'Falling Through the Net II: New Data on the Digital Divide' noted that the US government had "made it a fundamental goal to connect all Americans to the information infrastructure". However the report also identified that the 'digital divide' had increased since the previous survey. Similarly in the UK, a 1996 government paper 'Government Direct' set out the government's vision to increase the electronic delivery of information and services, but raised the problem of ensuring universal access (UK Government 1996). This was supported by the incoming New Labour government, declaring that it sought to ensure the UK would be "a world leader in the new knowledge economy", setting up a government office called the Office of the e-Envoy to lead "the drive to get the UK online" (Cabinet Office 2003). British Prime Minister Tony Blair declared that he wanted to ensure "universal access" by 2005 (Cabinet Office 2000) and the government noted its concern that citizens should not be "left behind in the new knowledge economy" (Gordon Brown quoted in Shearman (1999)). Policy continues to be a driver in developing ICT initiatives; the 2005 UK Digital Strategy declares universal local access "by 2008" (Cabinet Office 2005). This concern has lead to ICT initiatives being funded in many countries and some of these are described in further detail below.

Academic research interest also continued to grow in the 1990s considering the impact of ICTs within geographical communities, leading to academic conferences and more in-depth studies. For example, in 1994 the 'Ties that bind: building community networks' conference was held by the Morino Institute and Apple Computers, and the RAND Corporation undertook a study of five US community networks in 1995, including Doug Schuler's Seattle Community Network, the MIT supported Playing to Win Network, and the Virginia Tech driven Blacksburg Electronic Village (BEV). University research began to form a major strand of exogenous local ICT initiatives, and the BEV probably remains one of the longest running studies.

The BEV had been set up in 1993 as a collaboration between a local university, the Virginia Polytechnic Institute and State University ('Virginia Tech'), the town authorities, and key support from the telecoms company Bell Atlantic. Virginia Tech was interested in "performing research on the idea of a 'wired community'" (Cohill 2000), in the local rural area focused around a university town while Bell Atlantic was very much interested in exploring "a test bed for services that will be demanded by customers in the future" (Silver 2004). Bell Atlantic withdrew from the project as it evolved, and Blacksburg Electronic Village was developed as a separate non-profit making company, though still funded by the university and the local authorities. As a critical mass of users were brought online (currently 87% of the population are online) focus shifted from access to use, and "interventions … directly targeted at increasing the amount of communication within a community about that community" (Kavanaugh and Patterson 2002). Research has shown that the services are most used by 'early adaptors, highly motivated technically competent users (Kavanaugh and Patterson 2002) and that the 'late majority' use services less. 85% of BEV users are in some way affiliated to Virginia Tech (Arnold, Gibbs and Wright 2003). Kavanaugh suggests that this supports Putnam's research (Putnam 2000) indicating that the project may not generate social capital across the community and that users remain as individuals and do not increase their communication "…experience in Blacksburg suggests that…social capital may turn out to be a pre-requisite for, rather than a consequence of, computer mediated communication" (Kavanaugh and Patterson 2002).

In 1996 the Massachusetts Institute of Technology's School of Architecture and Planning held a colloquium on “Advanced Information Technologies, Low-Income Communities, and the City”, with the intention of bringing together academics, activists, planners and educators “to consider the prospective impacts and potentials of advanced information technologies for low-income populations.” . A feasible method of overcoming the ‘digital divide’ would be to support the setting up of local points of focus where people could access ICT and be supported in a community setting; building on Papert’s ideals of constructivism (Papert 1993). Beamish identified three models of community involvement with technology: “community computing centers, community networks, and community content” (Beamish 1999).

In part influenced by this work, Nicol Turner and Randall Pinkett developed the Neighborhood Technology Resource Center (NTRC) in Chicago to support a low-income housing estate, the Northwest Tower Apartments (Turner and Pinkett 2000). Based in a community room with twelve computers in a 150-unit low income housing block, Turner and Pinkett sought to increase the social and economic capacity of the residents through access to ICT, and encouraging the mapping of local resources as a means to this end. The researcher aimed to apply constructivist based principles to the provision of community technology: “a process to serve the local geographic community - to respond to the needs of that community and build solutions to its problems" (Morino 1994). The NTRC was seen as a focal point for learning and training, and developing the capacity of the community in a broader social and economic sense than just the provision of ICT skills; the intention was to enable community members as active change agents rather than passive recipients of support.

Similar centres, sometimes known as ‘telecentres’ formed the basis of many publicly funded local ICT initiatives in the 1990s, providing “broadband islands” (Day and Harris 1997) for local communities. The concept originated in Scandinavia in the 1980s, aiming to provide “computers and telecommunication facilities and support for local communities in remote, rural regions and in low income urban settlements’ (Qvortrup 1994). Qvortrup identified more than 200 telecentres in 11 countries in 1993, with very different characteristics, reflecting their local circumstances. However many were funded externally, and as public funding ran out, a large number struggled to survive or were forced to alter their priorities to survive. Since their inception there has also been the concern that they might privilege particular members of the community, and that to achieve universal access, resources must be available in every home.

Pinkett extended Turner’s work within a housing development in Boston, ‘Camfield Estates’ in 2000. Activity was focussed around a ‘Neighbourhood Technology Center’ and included providing participating residents with their own computer. The aim was to engage the community and improve its social environment through ICTs, using Kretzman and McKnight’s concept of ‘Asset Based Community Development’ (Kretzmann and McKnight 1993). Within this methodology the community is first encouraged to map (identify) its assets, then mobilise these resources to solve current problems and improve the quality of life for residents. A group of Camfields Estate residents were employed to gather data and enter it into an MIT supported community database, ‘Creating Community Connections (C3)’ (Pinkett 2002). All residents in the Estate were then encouraged to participate in using this resource, and enrol in computer training; those who signed up for courses were given a free cable modem and computer (31 households). Pinkett’s research drew upon a wide partnership of academic and commercial sponsors, and as the internet has become more common, interest in the ‘wired neighbourhood’ (Doheny-Farina 1996) has led to pilot projects being set up by commercial developers.

‘Netville’ in Toronto was purpose built by developers as a high tech middle class suburb (“Canada’s First Interactive New Home Community”) with an ICT infrastructure as part of the design. Each house was to be provided with high speed internet connections and a range of internet based services such as an online jukebox, desktop videophones, online health services and local discussion fora. In exchange for free access to the services for two years, the residents agreed to be studied by the technology consortium that had developed the services. Only half of the houses were connected, which proved to be a useful control group for Keith Hampton and Barry Wellman’s studies into ICTs’ impact on social networks (Hampton and Wellman 2003). However, while the tenants assumed the technology infrastructure was permanent, the technology consortium saw it as a limited trial, and after a certain period made the decision to terminate the services. Hampton found the greatest amount of community interaction occurred at this time (Hampton 2003) and that weak social ties rather than strong ties increased as a result of the technology .

Hampton continued research on local ICT initiatives, developing the “e-neighbors” project, a longitudinal comparative study of 4 neighbourhood case studies. This study investigated the effect of a “technology intervention” (Hampton 2004) – an intranet site and measured how this would affect the sense of community over time. Hampton has developed this concept further with his i-neighbors project (http://www.i-neighbors.org) in 2004, creating a software engine that allows anybody in the USA or Canada to create their

own community intranet to help "communities build 'neighborhood social capital'" (http://www.i-neighbors.org/about.php).

In Australia, the Stonehenge Group (a property developer) built a purpose built wired neighbourhood in Melbourne, Williams Bay. The development was proposed in 1998, and the first residents occupied the 51 new houses in 2000. Key to the new development were broadband connections for all properties and an official intranet site, "The Range" developed with the intention of stimulating community interaction amongst the new residents, to support "mutual reinforcement of web- based and face-to-face communication" (Arnold 2002) but also as a tool for developers to enable the "complete digital archaeology" of the house" (Arnold 2000). Launched in March 2002, access to the intranet was extended a month later to existing neighbouring properties, increasing its reach to 100 households. The intranet site was a US community portal "installed in over a 100 US communities" (Arnold 2002) but its American bias caused some initial resistance from residents (Wright 2005). It was seen as key that the intranet should reach all the new residents "without universality, an intranet is clearly not a community good but a private benefit" (Arnold 2002) and resident involvement in its design and operation was sought from the outset by the developers. Usage of the intranet site was low (Arnold, Gibbs and Wright 2003) and has continued to remain lower than expected, perhaps emphasising the divergence of community and developer's needs or purposes (Wright 2005).

In 1997 the Irish national telecoms provider (Bord Telecom Éireann) ran a competition to create an 'Information Age Town', requesting submissions from towns with a population of between five and thirty thousand residents. The town of Ennis in County Clare was awarded a grant of fifteen million Irish pounds over five years (1997 – 2002) to become "the largest community technology project in the world" (McQuillan 2000), a whole European town moving online to overcome the digital divide (Warschauer 2002). The brief of thecompetition asked five questions:

1. What happens when every home has a telephone - not just an ordinary telephone, but one with sophisticated voice-mail, caller-line identification and other advanced services?
2. What happens when every business, large and small, has access to an ISDN connection and high-speed access to the Internet?
3. What happens when every student in the education system, from the age of five, has regular, intensive access to a computer with learning, knowledge-gathering and communications tools?
4. What happens when public services - from libraries to healthcare - are fully equipped to exploit the potential of the Information Age?
5. What happens when the majority of households have a personal computer linked to the Internet?

At the heart of Ennis' proposal was a plan to give internet ready computers to every resident, and build a high speed network. However the outcome was a large amount of technology and money imported into a town with little input from the residents, and without considering their existing social practices. The telecoms provider was interested in the technological impact, and less thought was given to the social effects. Warschauer suggests that the runners-up in the competition, who had less money to spend, developed a more inclusive process to implementing the technologies and had more to show for their efforts to promote social inclusion as a result (Warschauer 2003).

In the UK, the British government aimed to provide internet access to all by 2005. To achieve this, the decision has been taken to equip locations across the country with network connections and computer facilities and develop approximately 6000 UK Online Centres (Smith and Cook 2003). These have been intended to offer computing services, access to government services online, and access to learning, both ICT skills and other further education opportunities. Many of the UK Online Centres have been set up in existing community centres such as libraries that already have a role in informal and formal community based learning. The aim of the UK online centres is to bridge the gap between those in society who have access to and are able to use information and communication technologies competently and those who do not, through open and flexible access to ICTs (Smith and Cook 2003). One of the key objectives of the centres is to provide local services within the community, served by local staff.

In March 2000, the UK government allocated £10 million to a series of pilot projects: the "Wired up Communities Programme" (WuC). Seven geographical communities of up to 4000 people each across the UK experiencing levels of social exclusion were provided with home internet access, computers, and technical support. WuC sought to investigate whether this would enable the communities to overcome the barriers to use of the Internet, and if digital access to learning opportunities, government and other web services would foster social inclusion. The WuC programme was 'experimental' (Devins, Darlow, Petrie and Burden 2003) without defined delivery structures or goals, and highly variable combinations across projects.

The WuC programme focussed on investigating which combination of connectivity (dial-up, broadband) and access device (new or refurbished PC, or set-top box) would prove most effective. Funding for training, community engagement and local website development was based on revenue generation and in some places this proved problematic to secure, leading to scaled down outreach and training activity in some of the locations. Equipment supply also proved problematic: in one instance the company supplying computers ceased trading, and others where late delivery of equipment caused severe delays in setting up programmes and resulted in low take up. Where projects developed successfully though, follow up surveys suggested the programme has positively affected social and digital engagement. The pilot projects illustrated the difficulty in wiring up a 'whole community' and the varying success of the pilots after the funding period had finished draws attention to difficulties of ensuring sustainability.

The UK Government has continued to explore the possibilities of wired up neighbourhoods with the Oakgrove Millennium Community, in Milton Keynes (Gaved and Mulholland 2005). The Millennium Communities Programme was set up in 1997 by the Deputy Prime Minister to investigate models for innovative and sustainable communities, building 6000 new homes in seven locations across the country. Each has a theme, with 'technology' the focus of the Oakgrove Millennium Community. 1850 houses will be built, each with fibre optic cabling providing a high speed network, connecting the houses, the local schools and health centre to each other and the Internet. An Oakgrove "community data network" will be developed offering intranet and broadcast services. The project planners seek to create a "neighbourhoods where networking influences how people meet, interact, create and work" (English Partnerships 2005). Users will be offered the connection and services as a fixed low cost package. The first houses are due to be occupied in early 2007.

4.1 Self provisioning responses to the digital divide

As well as exogenous interventions into local neighbourhoods and commercial investments into new housing schemes there have been examples of grassroots driven ICT initiatives undertaken from within local communities. Many of the early BBS and Free-nets were started by innovators within their local communities (Schuler 1994) and this model has continued until the present. Similar to other earlier technologies such as the radio and the telephone, innovators and early adopters within communities have appropriated new technologies for their own uses, either as a response to lack of provision, adopting inflexible exogenous framings of technology, or innovating for their own purposes.

Grassroots initiatives are often funded from within the community, volunteer run and responding to the demands of the local population. Such initiatives may offer a more sustainable model for local ICT provision than exogenous interventions: as the Redbricks initiators note, "the very fact that the project is not dependent on external money means that there is nothing to run out of" (Davies 2004).

Gaved and Mulholland (2005) divide grassroots driven initiatives into three broad categories:

- Pioneers: technological innovators and early adopters exploring ICTs within the context of community usage.
- Subcultures: technology innovators and domain experts using ICTs to support communities of interests which are in part socially bound by the locality
- Cooperatives: community based groups exploring ICTs for their potential ability to support neighbourhood needs and purposes

The term 'grassroots' emphasises the 'bottom-up' locally driven nature of such community activism, though grassroots developments encompass a wide variety of actors. Local ICT initiatives may be completely owned, managed, financed and maintained within the community or they may involve partnerships with public or commercial partners in the short or long term.

Early grassroots initiatives were driven by technological innovators interested in applying ICTs within local community settings. Early groups represented local computer users working together to build community resources, such as community driven websites to share local information. Consume.net – a London based and eventually UK wide group of wireless networkers was inspired by early BBS's (Stevens 2005) appropriated wireless networking equipment designed for offices to build local user owned infrastructures across London. Bringing together technical experts with strong free software ties, these "geek activists" investigated how local community wireless networks could be developed, and published an online map that anybody could use to find a neighbouring wireless enthusiast or service and make use of (Priest 2004). Similar wireless networks sprung up across the planet, such as NYC Wireless, SeattleWireless, and Bay Area Wireless Users Group. These pioneers often worked alongside community activists to help develop

solutions for rural communities unable to get broadband internet access; in many countries the telecoms providers were not interested in providing broadband to sparsely populated areas and grassroots initiatives were required to assure access. In the UK, until recently, British Telecom maintained 'trigger levels' – minimum advanced requests by residents of a locality for broadband connectivity- before they would enable local exchanges, leading to many communities needing to consider innovative solutions to get access to higher speed connections, such as unlicenced wireless ('wi-fi'), satellite links, and collaborations with internet service providers to provide dedicated leased links. In the UK the Community Broadband Network has acted as an umbrella movement for rural (mainly wireless) community networks (Corbett, Annison and Cobb 2005) utilising domestic wireless equipment to connect villages separated by several kilometres. CBN estimates that there are currently (November 2005) over 100 such grassroots driven initiatives operating in the UK (Community Broadband Network 2005). In Denmark, a locally driven regional initiative to connect rural Djursland started in 2001 with residents renting a fibre optic backbone from an unused hospital network, and providing wireless connections to local people. This has developed into an EU supported pilot project connecting 10 villages ('Noerre-DjurS.net') and now forms the core of the EU supported Baltic Rural Broadband Project. The local activists have since formed the 'Djursland International Institute of Rural Wireless Broadband', to act as a training centre for rural community networkers across Europe and developing countries.

Urban areas have also developed grassroots ICT initiatives, often originally because of the high costs associated with achieving faster than dialup connections through the commercial service providers. The 'Redbricks' group in Manchester is one of the earliest examples, operating since 1998 (Skyva 2002). A group of local residents in this low income housing estate shared the cost of a high speed connection and began connecting their neighbours, running cables between the maisonettes, providing 150 houses in the estate with low cost shared network access and intranet facilities (Hellawell 2001). Many of the residents wanted ICT access in the home rather than a local learning centre, and were attracted to the benefit of local technical support. Redbricks has become a model that other groups have followed and continued to influence other grassroots initiatives as well as being the subject for researchers investigating bottom up developments.

As the broadband landscape changes and it becomes cheaper and easier for individuals to get a higher speed internet connection to the home, the original 'cheap access' or 'only option' selling point of grassroots initiatives has diminished, but the surrounding benefits of local support, skill sharing, and locally developed content remain significant. Discussions of the digital divide and digital inclusion have begun to embrace more complex interpretations of ICT usage than simple 'access' and more complex dimensions of digital sufficiencies need to be addressed: DiMaggio and Hargittai suggest not only equipment, but also autonomy of usage, skills, social support and a sense of purpose (DiMaggio and Hargittai 2001). Grassroots initiated networks may offer a more sustainable method of overcoming these multiple insufficiencies.

A recent BT report suggests that digital exclusion will not completely diminish as time moves forward – despite Williams' et al. consideration of the young as "digital natives" (Williams, Wallace and Sligo 2005), the report suggests that up to 23 million adults in the UK will be at risk from digital exclusion in 2025. Access may diminish as a barrier as prices are reduced, but the further dimensions of exclusion need to be carefully examined and challenged.

5 Rural local ICT initiatives

In many countries there is a rift between ICT provision in urban and rural areas; ICT development is aggravating rather than ameliorating existing socio-economic breaklines (Commission of the European Communities 2005). As with earlier communications technologies such as the telephone (Fischer 1992) commercial providers focus first on large population and financial centres and only much later consider low density and low-income areas. The rural poor are often the last people to be connected to the internet (Sullivan, Borgida, Jackson, Riedela, Oxedine and Gangl 2002). While this is particularly noticeable in large developed countries with distributed populations such as Canada and Australia, it can also be seen across Europe. This causes problems for rural communities seeking access to ICT: they are not financially interesting to commercial providers, and the high cost per person makes them more expensive for government funding. Simpson et al. note that government funding has been allocated on the basis of rural public access points becoming economically self-sustaining and yet "most rural telecentres experienced difficulty in becoming commercially viable entities" due to the low population levels (Simpson, Daws and Pini 2004). This is mirrored in the UK: in a survey of 300 telecentres a significant proportion indicated that future sustainability was dependent on continued public funding and a quarter was no longer functioning (Liff, Stewart and Watts 1998).

This lack of access has lead to the development of highly innovative and locally run responses; in the UK the Community Broadband Network identified over a hundred local initiatives in a 2005 survey (Corbett, Annison and Cobb 2005) developed from within rural communities. Onxy and Bullen's study of social capital across five communities noted that social capital was generally higher in the rural communities compared with the urban centres, particularly in relation to community connections, feelings of trust and safety and neighbourhood ties (Onyx and Bullen 2000), which would suggest that local ICT initiatives may be more successful and sustainable in rural areas. However, while bonding capital may be high this is not always complemented by sufficient levels of bridging capital (Onyx and Bullen 2000). This may leave rural ICT initiatives as vulnerable and having a greater need for opportunities to collaborate or for government support of associations.

6 The impact of local ICT initiatives on Social Capital and Quality of Life

Local ICT initiatives are often driven by a belief that they will generate social capital amongst the recipient population, encourage participation and equity, and improve quality of life . Social capital draws much of its philosophical underpinning from a communitarian position (Onyx and Bullen 2000) so we can expect ICT initiatives to aspire to increase community well being across many of the constituent quality of life indicators.

In this section we review the literature to investigate how well local initiatives address these ambitions. The research literature available is limited: the majority of local ICT initiatives have only been undertaken in the last decade and few studies have examined long term effects. Exogenous initiatives often monitor key indicators through their funding period, but are often fixed term projects, and longer term longitudinal studies are more rare. Grassroots driven initiatives started from within communities of locality tend to be open ended with no fixed termination point, and so lend themselves to longer term studies. However, with less emphasis on external accountability they are often less formal in recording their reflective processes and as a result little formal research exists on their effects. Grassroots initiatives have attracted the interest of external researchers but generally the research has taken the form of interviews rather than longitudinal studies. The scarcity of data available examining specific communities over long periods of time is compounded by the rapidly changing internet and wider social environment which makes it difficult to make many meaningful longer term comparisons, however we expect in the future that the rate of internet development will slow. In the meantime we can make some initial observations.

Overall though, we find that the initial impact of ICT initiatives tend to be encouraging, with increased access to the internet and a broad range of usage. This usage is often reported to increase measured social capital, both in existing and newly populated communities of locality. Initiatives would appear to encourage civic engagement, and are often well received within the host communities. Both bonding and bridging capital can be positively affected by the introduction of ICT within the community, helping strengthen bonds within the locality and also maintain contact with distant friends and relatives, and negotiate with external bodies such as local authorities. When measured against quality of life indicators, local ICT initiatives can be seen to potentially benefit most aspects, improving social and economic well being within their host communities.

However many of the initiatives are relatively young and most reporting focuses on the effects whilst they are in operation. Long terms effects are hardly ever captured by project based assessments. As yet, there is very little research to indicate what happens after initiatives finish. Early indications suggest that sustaining ICT initiatives can be a major issue not always considered at their launch. Exogenous ICT initiatives may only be funded for a limited timescale and resources withdrawn, grassroots initiatives may fail due to technical or social reasons. The ending of the ICT initiative may in itself cause difficulties through the withdrawal of ICT access or support; and furthermore this may lead to reverses in social capital or quality of life indicators initially enhanced by the initiative; the benefits may wear off. In some cases, initiatives may be appropriated by host communities and continue in a different guise, or alternately they may cease to operate. Little research appears to have been carried out in this area and we can only make general hypotheses about what might happen.

The following sections examine in more close detail the effects of local ICT initiatives. We first consider the overall framework, and then examine the short term effects. Finally we make some general hypotheses about the possible long term effects of ICT initiatives.

6.1 General findings

Initial reports from local ICT initiatives are usually highly positive. Initiatives are started in the belief that they will succeed and generally report early successes. While external developers and communities may have different objectives (Gaved and Mulholland 2005), there is likely to be enough common ground to show positive initial results. The Williams Bay researchers envisaged that like the telephone, local ICT services

would support rather replace existing communications and help develop social capital: "it is not a zero-sum communications game… Rather the telephone is used to facilitate face-to-face meetings and to preserve ties that might otherwise languish in the time between face-to-face interactions. The telephone means more visits, more links, not less. It is likely that the intranet will serve the same function." (Arnold 2003).

The initial results of engaging a community with a local ICT initiative are often encouraging. External funding to alleviate real or perceived deprivation is likely to be well received, and benefit at least a proportion of the community. Even those members that are not directly benefiting are likely to approve of positive community interventions, and it is likely that any form of ICT intervention will result in an increase in some measures of social capital and quality of life indicators. Community activism itself implies a generation of social capital and is likely as a result to help improve quality of life indicators such as the development of interpersonal relationships, community involvement, a sense of contribution to the community and involvement in local issues.

Many initiatives report high levels of initial enthusiasm by interviewees for the idea of ICT intervention within their communities. In 1996 more than 45% of the population of Blacksburg was connecting to the Blacksburg Electronic Village (Carroll and Rosson 1996). 79% users expected it to help social relations, and 72% expected it to help in civic affairs. 25% of businesses in Blacksburg signed up to some form of presence, and from January 1994 to January 1996, 75,000 visits were made to public access terminals connected to Blacksburg Electronic Village (BEV). Tharpe and Dekkers note a high level of enthusiasm for publishing community content within Queensland community technology centres (Tharp and Dekkers 2003) and Turner and Pinkett found that 25% of the population of the Northwest Tower Apartments in Chicago were interested in acquiring computer skills (Turner and Pinkett 2000). Users have many suggestions about what could be done with new services: Blanchard and Horran (2000) found in California that high on the list of interests are self-education and getting involved in their children's education (78%), wanting to communicate with friends and family (69%), and increased access to government services (62%). ICT initiatives clearly have a broader role to play than just providing internet access; users anticipate it will help with a broad range of social activities that are reflected in the SOCQUIT quality of life indicators (Anderson, Dries, Gaved, Heres, Mooy, Stoneman and Thomas 2006).

This broad range of aspirations shows that ICT initiatives can address 'more than just access' which has dominated much of policy level discussions surrounding the information society' and overcoming digital divides. Digital inclusion involves more than providing infrastructure access, and local ICT initiatives may be able to challenge multiple insufficiencies. DiMaggio and Hargittai identified five key dimensions that need to be overcome to ensure meaningful usage: access, training, skills, support, and purpose (DiMaggio and Hargittai 2001). In the next section we examine DiMaggio and Hargittai's five dimensions of inequalities, and consider how local ICT initiatives may be able to address each.

6.2 Overcoming multiple dimensions of digital inequality

Di Maggio and Hargittai hypothesise that rather than a simple 'digital divide', there are multiple dimensions of digital inequality, all of which must be overcome to ensure meaningful ICT usage. In overcoming these multiple dimensions, local ICT initiatives may directly impact upon quality of life indicators and improve social capital.

6.2.1 Access

Access provided the focus for earlier initiatives (e.g. the Blacksburg Electronic Village) and is still often the key driver for many exogenous ICT interventions. Technologically deterministic approaches hypothesise that providing access to the internet allows otherwise marginalised citizens to participate in the 'networked society' and that social inclusion and improved quality of life will follow (Rheingold 1994; Dutta-Bergman 2005). Some of the earlier initiatives provided the only feasible method of internet access for localities due to financial or geographical exclusion. While this role has diminished - 96% of UK citizens now know somewhere they can get online access - providing internet access may still represent a necessary element to ensure the participation of marginalised members of communities (Maxwell 2005; Williams, Wallace and Sligo 2005). The Wired up Communities (WuC) project in seven UK communities, for example noted that 59% of respondents had used the Internet at home for the first time as a result of the programme (Devins, Darlow, Petrie and Burden 2003). The increasing availability of broadband services mean that ICT initiatives may no longer be the only provider; Hampton's work on the US e-Neighbors project could assume residents had access to some form of internet connectivity (Hampton 2004).

Clement and Shade (2000) argue that there are three main access questions to address:

1) Access for what purposes?

2) Access for whom?
3) Access to what?

Clement and Shade have developed an 'Access Rainbow' providing layers of potential access, leading from physical infrastructure ("carriage facilities") and building up to questions of governance:

1) Carriage – the infrastructure for transporting the data
2) Devices – the computers and other devices used by the individual
3) Software Tools – the browser, email client and other software needed to use the Internet
4) Content/Services – online databases and website repositories of information; email and e-commerce services
5) Service/Access Provision – local ISPs and community access points
6) Literacy/ Social Facilitation – text and computer literacy; training and support services
7) Governance – public consultation on policy issues; social impact assessments

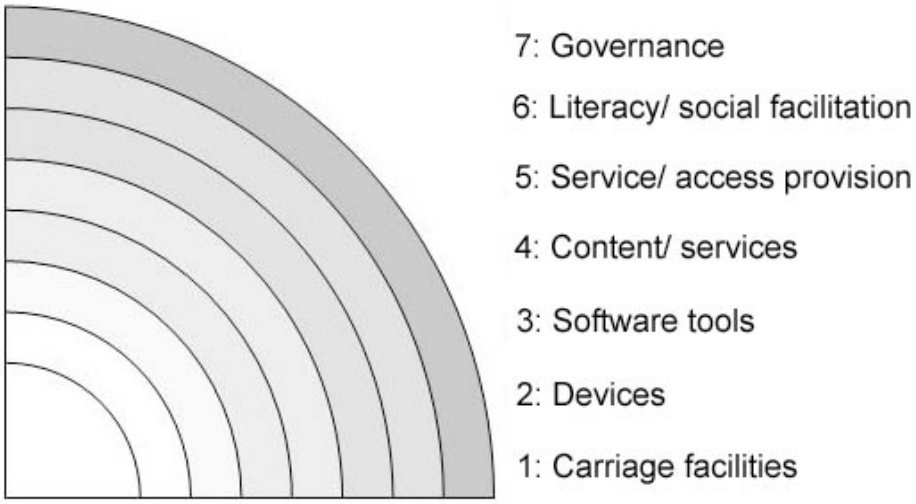

Figure 3: The Access Rainbow (after Clement and Shade (2000))

Each level builds on the previous one, perhaps analogous to Maslow's hierarchy of needs. ICT initiatives must be based on a solid foundation of basic infrastructure: the basic level of provision need to be in place at a physical level. However it has been argued that exogenous ICT interventions can place too much focus on achieving this goal, without considering what is appropriate for the specific community needs or purposes.

Gaved and Mulholland (2005) draw on Stanoevska-Slabeva and Schmid's typology of online communities (2001) and describe a simple model of networked communities with ICT infrastructure as a foundation, but place emphasis on the importance on considering community purposes and functions: ICT initiatives must address all of these 'layers' with equal weighting, and should maybe consider working from the social purposes down to physical requirements, rather than from the technical to the social.

Community purposes
Community functions
Software tools
ICT infrastructure

Figure 4: Layered model of networked communities (Gaved and Mulholland 2004)

6.2.2 Training

The majority of local ICT initiatives offer some level of training, whether formal or informal, though the amount may vary even with an individual initiative (Devins, Darlow, Petrie and Burden 2003). This can act as the basis for the development of social capital, developing social ties within the community, and benefiting residents both in the direct sense of educating ICT skills and the broader benefits of a wide range of quality of life indicators such as improving employment prospects, increased self-esteem, supporting existing or new hobbies, and greater community involvement. Training is a key capacity-building aspect and is often popular with residents.

Most exogenous ICT initiatives include training as an aspect of their intervention. It may be a prerequisite to receiving discounted or free equipment, e.g. Ennis (McQuillan 2000) or Camfields Estates (Pinkett 2003), informal help for drop-in users or part of formal training programmes. Initiatives based around specific locations such as telecentres often have drop-in training, with staff either on hand or available to be booked to help users, for example. 87% of UK Online Centres offer courses on using the internet (SQW Limited and MORI Social Research Institute 2005). In some cases more formal training programmes may be offered leading to accredited qualifications such as the European Computer Driving Licence or brokering vocational certification through local colleges (Maxwell 2005). Training will often be based on teaching internet and computer skills but often is focussed on developing local content: lack of relevant content is a major barrier to ICT take-up in low income communities (Lazarus and Mora 2000).

In grassroots ICT initiatives, this is more likely to be an informal process centred on the connecting and setting up of individual residents' computers to the community network (Gaved 2003). Often the technical team will talk the new resident through the set up process, and help the new user online. Ongoing training is often informal and carried out through existing social ties. Grassroots initiatives will often have an informal process of supporting neighbours with technical issues and responding as issues arise, sometimes providing a drop-in service to the network's technical experts. Most training is provided through existing social ties, with individuals supporting each other through skills exchanges for specific purposes, such as attaching photographs to emails or using mailing lists.This informal training between participants helps develop both bridging and bonding capital (Foth 2005).

6.2.3 Support

A sustainable ICT initiative requires resources dedicated to providing ongoing support; both for the participants and to ensure ongoing operation of infrastructure. DiMaggio and Hargittai identify support as a critical issue in ensuring continued use of ICT by participants, and this is required both in a formal sense by learners from experts, and informal support amongst equals within a community. Non-users consistently report being deterred from ICT because of its perceived complexity. In an exogenous initiative it is likely that this will be formally designated only for a limited period while funding lasts (Mäkinen 1999) but both exogenous and grassroots initiatives assume the host community will take on this role informally in the future. This can be seen as an additional barrier to sustainability but it can also be considered a positive requirement, and many researchers suggest the requirement for ICT support within a community may lead to the development of social capital. Wyatt et al. refer to the value of a "warm expert" – somebody already known within the community who can also provide expert domain advice, for example a family member or a friend (Wyatt, Allison, Donoghue, Horton and Kearney 2003). Ferlander (2003) notes the ideal that informal support will foster the development of intergenerational integration, with young people helping older residents, a view mirrored by the HomeNet study which suggested the need for support elevates the value of teenagers within a household as they often become the local 'technical guru' (Kiesler, Zdaniuk, Lundmark and Kraut 2000). Pinkett (2003) notes both formal and informal support used by participants in the Camfield Estates initiative, with those participants having greater access to support being the greatest learners, and all participants having extended their local ties through involvement with the initiative. The withdrawal of support can lead to the collapse of ICT usage (Jæger 2001) and any increase in social capital may suffer.

6.2.4 Skills

A key objective of the majority of ICT initiatives is to offer skills training in ICT usage, directly addressing several of the SOCQUIT quality of life indicators of development and education. Van Dijk and Hacker (2003) suggest that as access becomes more widespread, the gap in ICT skills will become a more significant division in society and ICT initiatives will need to focus on this as a priority; this is identified as a key potential barrier to digital inclusion (Commission of the European Communities 2005). ICT initiatives employing an asset-based community development model (Kretzmann and McKnight 1993) see broader skills training as a critical aspect of the ICT initiative and view community building as the ultimate purpose, working with community members as active change agents rather than passive beneficiaries or clients. This

methodology has been employed by Turner and Pinkett in the Northwest Towers initiative in Chicago (Turner and Pinkett 2000) and Camfield Estates in Massachussets (Pinkett 2003), with participants being trained to gather community information about local facilities and services, and entering this into a local database of resources. Pinkett refers to skills that benefit individuals within their locality as 'community cultural capital' (Pinkett 2003) and he sees a development of this capital in the participants of the Camfield Estates initiative, helping to develop "collective transformative power" (Pinkett 2003). ICT skills training itself may help increase the confidence of participants and enable them to find employment, noted in a number of cases in the UK Wired up Communities project (Devins, Darlow, Petrie and Burden 2003).

6.2.5 Purpose

"When aiming at the socially excluded, content is the key, not connection. The success of digital television and mobile phones shows that people will go digital when there is something in it for them." (Cross 2005)

DiMaggio and Hargittai propose that meaningful ICT usage will only occur if it fulfils a real purpose for the recipients; if there is no reason to use the technology it will be quickly discarded as irrelevant. In common with the SOCQUIT project, many initiatives and communities see ICT as potentially supporting a range of social benefits and increasing quality of life. Selwyn (2002) hypothesises that this social quality of life can be also be broken down into dimension of participation in society:

- Production activity (paid work, education, raising a family)
- Political activity (engaging in collective efforts to improve social and physical environments)
- Social activity (social interactions with friends and family)
- Consumption activity (consuming services and goods)
- Savings activity (accumulating savings and owning property)

These dimensions are close to the SOCQUIT model and we will consider examples of how local ICT initiatives address these in section 6.7, below). Many researchers have noted the lack of local content to engage community users, and view local content creation as an essential part of giving the ICT service relevance (Pinkett 2003; Tharp and Dekkers 2003).

As internet access becomes more ubiquitous, it is clear that as well as the "truly disconnected" who are unable to gain access to ICT, there are also "net evaders" who don't see the relevance of ICT usage to their everyday lives and "net dropouts" who are no longer online (Lenhart, Horrigan, Rainie, Boyce, Madden and O'Grady 2003). 46% of UK non-users (Cabinet Office 2005) and nearly 30% of non-users in the EU 25 countries cited "lack of interest" as their reason for not accessing the internet (Commission of the European Communities 2005). If local ICT initiatives are to engage a broad range of users within a community it is important that they engage users and provide tools and content that are relevant to users' needs.

6.2.6 Civic engagement

An underlying question in the field of community informatics is to ask what the ultimate purpose of ICT within the community could be, and how an intervention will ultimately benefit neighbourhoods (Keeble and Loader 2001; Day and Cupidi 2004). Clement and Shade (2000) ask "access for what purposes?" and Warschauer argues that it is bound up with debates about social exclusion, economic regeneration of deprived areas and the breakdown of social capital and community relations (Warschauer 2003). Shah, McLeod and Yoon (2001) describe civic engagement as one of the key components of social capital. Civic engagement can be measured in a broad range of activities, from informal social interaction through to awareness of local events and formal political activity. Researchers have noted increased levels of civic involvement corresponding with higher internet usage (Kavanaugh and Patterson 2001; Shah, Mcleod and Yoon 2001; Cordell and Romanow 2005), although the motive for using the internet is more important than the amount of time spent online (Williams, Wallace and Sligo 2005). It is important for people to have a purpose to use the ICT initiative; merely providing access to civic tools via the internet will not ensure usage.

Turner and Pinkett's work focuses on civic awareness as well as engagement, based on the theory of asset based community development. Their approach emphasises the mapping of neighbourhood assets by local residents undertaking a data collection process, identifying resources such as local businesses, youth centres, and social groups (Turner and Pinkett 2000; Pinkett 2003). These assets are then added to purpose built community databases that can be accessed by the residents, either through home computers or a neighbourhood community technology centre. The concept is one of self-realisation, an engagement with the local environment and leverage of existing resources to develop further social and economic development. Pinkett reports that after the first year of operation of the Camfield Estate technology centre, a survey noted

a general increase in civic awareness amongst users, for example knowing the skills and abilities of other residents in Camfield Estates (up from 11 to 32%), volunteer opportunities in the community (up from 0% to 42%) and community activities and events (up from 11% to 58%).

Wellman et al.noted that heavy internet use can be associated with increased civic engagement, but concluded that for the most part this did not mean that people became more engaged. Rather, those already engaged are increasingly using the internet as additional tool in their work (Hampton 2001; Wellman, Quan-Haase, Witte and Hampton 2001)In Netville, Hampton noted that "wired residents knew three times as many neighbours, talked with twice as many and visited 50% more of their neighbours compared to non-wired residents" (Hampton 2001). Community involvement increased across several measures with wired residents using the network to organise barbeques and parties, search for missing pets, exchange information about local services and sharing information related to local government issues (Hampton 2004). One of the most significant aspects of civil engagement was the use of the ICT tools to organise and act collectively against the hosing estate property developers, to complain about the quality of the homes and demand action in carrying out repairs (Hampton 2003).

The initial results of networked community initiatives are nearly always encouraging. Within the first year of implementation, civic engagement generally increases. Kavanaugh, however, has suggested that this is a phase rather than a trend, and reflects the initial take-up of ICTs by more proactive 'early adopters (Kavanaugh 2001). Kavanaugh has used data from community networking initiatives in four US towns and cities in the USA and identifies that early adopters are more likely to use the internet to increase their community involvement, political participation and connectivity with like-minded people. They are also more likely to engage in civic activities generally, and reflect a particular demographic within their communities, having a higher than average income and a higher than average education level. As 'later developers' come on board, Kavanaugh suggests that their interest in the ICT tools focuses more on online shopping and commercial services, so overall the use of the ICT initiative for civic engagement decreases, resulting in only modest effects on community involvement.

In summary, while research on linkages between internet use and civic engagement has shown that "overall internet use was found to be positively … related to civic engagement" (Shah, Mcleod and Yoon 2001), it is clear there needs to be a purpose for engaging with the ICT initiative, mirroring DiMaggio and Hargittai's concerns . It has been suggested that the communication, or relationship-building, function of the internet may be more important than the information function of ICTs in building community (Pigg and Crank 2004). This paper considers social capital as based on two basic concepts; those of strong ties (bonding social capital) and weak ties (bridging social capital), and different types of local ICT initiatives may be able support or even develop both.

6.3 Bonding Capital

The strong social ties between family, close friends and associates can be referred to as bonding capital (Putnam 2000). A high level of bonding capital is generally seen as a positive attribute of a neighbourhood, enabling support of individuals and the development of a community. Too high levels, however, can be negative, reducing tolerance of outsiders, stifling innovation, supporting unhealthy norms, and causing people to reject alternatives (Durlauf 1999; Cavaye 2004). Within a communitarian perspective the presence of strong bonding capital is considered to outweigh the negative possibilities, and it is with this view we consider how ICT initiatives may affect the development of social capital within a locality.

Whether ICT initiatives can significantly develop bonding capital is fiercely debated; it has been theorised by some researchers that strong social capital is required to develop a successful ICT initiative. Williams notes that groups with more bonding capital are associated with higher ICT usage (Williams 2005), using the technology to support existing group purposes. Grassroots initiatives are often found in 'elective' communities where there has been a history of community cooperation and strong local social ties. Sullivan et al. hypothesise that "communities that are rich in social capital see (starting a community based network) as a good way to draw citizens into a more active involvement in their communities" – that strong bonding capital leads to community activity, which in turn increases social capital (Sullivan, Borgida, Jackson, Riedela, Oxedine and Gangl 2002). Kavanaugh and Patterson (2001) also note that the Blacksburg Electronic Village initiative may well have been successful because it was located in a place-based community where high levels of social interconnectivity already existed. They suggest that high levels of social capital may be a prerequisite condition for, rather than a result of, effective computer-mediated communication.

On the other hand, Hampton (2004) notes the number of social relations supported by wired neighbours in Netville far outreached the connections maintained by their unwired neighbours: Wired residents recognised

by name three times as many local residents as their unwired neighbours, talked on a regular basis twice as often, and visited on one and a half times as many occasions. Wired residents also used the telephone more, making four times as many phone calls, demonstrating that network access increases other communications – rather than a displacement communication device, ICT is complementary, becoming part of a broader 'media ecology' (Altheide 1994) used to maintain social contacts. The neighbourhood email list was found to increase the amount of in-person socialising, as well as aiding collective action and political involvement. A key finding was that wired residents had more contact and exchange more help with friends and relatives living outside their neighbourhood; the ICT initiative supported "just out of reach" social contacts (Hampton and Wellman 2001).

In the HomeNet ICT initiative undertaken across four neighbourhoods in Pittsburgh, it was found that teenagers preferred to develop bonding social capital, strengthening their existing social circle, rather than broadening it: "teenagers preferred communication forums limited to their own high schools. The teenagers complained when their communication areas were 'invaded' by interlopers from other schools and asked for controlled-access forums for their own groups (Kraut, Scherlis, Mukhopadhyay, Manning and Kiesler 1996). The Atherton Gardens ICT initiative, based in a low-income housing estate in urban Melbourne, found that groups used ICT tools to develop bonding capital within their own social and ethnic groups, but had little interested in developing bridging capital to communicate with other cultural groups within the estate (Meredyth, Hopkins, Ewing and Thomas 2002).

Earlier concerns that online access would detract from face to face contact (Kraut, Patterson, Lundmark, Kiesler, Mukhopadhyay and Scherlis 1998) appear to be unfounded, and more recent studies of IST usage finds that this is assimilated into the wider range of tools used by individuals to support their social circles (Cordell and Romanow 2005). HomeNet showed that the ICT initiative can in itself develop intergenerational relationships: the importance of informal ICT support lead to previously undervalued teenagers being valued and called upon for their technical skills to support computer novices in their use of the new technologies (Kiesler, Zdaniuk, Lundmark and Kraut 2000). Support is required as "the computer is not yet an appliance" (ibid.) and often the nearest source of expertise is a friend or family member.

6.4 Bridging Capital

While bonding social capital represents the strong close ties between friends and family, bridging capital represents the weaker extended social ties between different groups. According to Stone and Hughes:

"Bridging social capital involves overlapping networks (in which a member of one group can gain access to the resources of another group because of overlapping membership" (Stone and Hughes 2001).

Bonding social capital helps people to 'get by' while bridging capital helps people 'get ahead': for example to find work, or cooperatively resolve shared problems in a locality such as vandalism or graffiti. Stone and Hughes argue that a balance of bonding and bridging community is required to ensure community sustainability: a strong close social circle is important but also "a tolerance of diversity" and a willingness "to forge cooperative relations with outsiders".

Bridging social capital can be divided between 'intra-community' bridging (local community ties) and 'inter-community' bridging (ties across the 'borders' of local communities); sometimes the latter is referred to as 'linking' social capital though it can be debated whether this is a separate form of bridging capital (Western, Stimson, Baum and Van Gellecum 2005). Bridging capital may also be analysed as to whether it provides 'lateral' bridging between equal partners (e.g. neighbouring residents groups) or 'vertical' bridging between more and less influential groups (e.g. the city council and a local residents' group).

A study of four geographically diverse communities in New South Wales (Healy, Ayres and Hampshire 2003) distinguished between 'intra-community' bridging and 'inter-community' bridging stating that this distinction is particularly useful when attempting to understand the role of social capital in communities facing rapid change. They also added a third form of social capital, 'linking', to refer to alliances between communities with any type of formal power, particularly with reference to their ability to influence social and economic development. This study was conducted in order to ascertain whether and in what way community ICTs could aid these different communities.

They found a greater sense of community inclusion in the rural communities, and also that this sense of inclusion was integral to the residents' quality of life, whereas in urban areas there was less of an association with the community. However, they also found that for all four communities, both inter and intra-community ties were strongly associated with quality of life. They conclude:

"Our research suggests that while local community development initiatives may be a precondition of social capital creation, they are insufficient on their own we contend that any adequate model of social capital creation must recognise the importance through different roles played by intra-community and inter-community networks in achieving positive change for communities". (Healy, Ayres and Hampshire 2003: p.7).

Community ICT initiatives may help maintain or even develop bridging social capital within communities of locality: "weak ties may be affected positively when the medium expands the reach and basis for initiating and maintaining ties, providing a means through which previously unconnected individuals can now initiate contact" (Haythornthwaite 2002). Haythornthwaite argues that a new medium introduced into a community's range of communication tools, for example the Internet, offers the social and technical potential for new ties to be realised – creating 'latent ties' which may later be actually developed. The additional communication media supports the maintenance of weak ties, filling in "the gaps between in-person meetings" and enabling "arrangements for future get-togethers" (Wellman and Gulia 1999). Stronger ties use a larger number of communication media and the Internet can help support and develop weak ties.

Several community ICT initiatives have been undertaken in new built neighbourhoods with an explicit goal of developing social ties between residents, for example Netville in Canada (Hampton and Wellman 2003), Ladera Ranch in the USA (Venkatesh, Chen and Gonzalez 2003) and Williams Bay in Australia (Wright 2005). High levels of social capital are often associated with long term residency of an area (Western, Stimson, Baum and Van Gellecum 2005) so it is not surprising to see ICT initiatives used to try to 'shortcut' the process. In Netville, the community ICT initiative most benefited the formation and support of weak ties, with those residents connected to the community network recognising more of their neighbours by name (Hampton and Wellman 2003). Sharing information online via the community mailing list was also noted as popular, ironically with the greatest use of weak ties being the drawing together of the residents to fight the closure of the network itself (Hampton 2003). Ladera Ranch is an example of a building developer commercially offering a community network as a product to encourage prospective homeowners to purchase a property, providing the new residents internet ready properties with high speed connections. The intranet provided by the developer has been seen to be successful in creating weak ties, with new residents finding neighbours sharing the same interests (Venkatesh, Chen and Gonzalez 2003) and follow Haythornthwaite's observation that a community ICT will often support rather than displace existing channels of communication (Haythornthwaite 2005). The community network as a commercial provision by building developers may become a more predominant model, with the Williams Bay developers choosing an American commercial product targeted at housing developments to encourage the sense of community (Wright 2005); this decision actually hindered the take up of the intranet and hence the anticipated development of weak ties as it was perceived as having too much of an American bias (Wright 2005).

Community network initiatives have been shown to be influential in the formation and maintenance of social capital, however these influences are complicated and sometimes difficult to predict. The HomeNet trial in Pittsburgh, USA initially appeared to show that Internet usage reduced social involvement (Kraut, Patterson, Lundmark, Kiesler, Mukhopadhyay and Scherlis 1998). However, three years later the researchers found that the reverse had become true for the majority of the studied group: that Internet was now used to enhance their offline social connections (Kraut, Kiesler, Boneva, Cummings, Helgeson and Crawford 2002). The HomeNet researchers found that "the rich got richer" with already well socially connected individuals becoming better connected through the community network. In the same manner researchers studying the Blacksburg Electronic Village noted that "bridging individuals" particularly benefited from the community network, using it as a tool for maintaining social relations and increasing face–to–face interactions, and acting as coordinators within their communities developing both bridging and bonding social capital across the local neighbourhood.

Community ICT initiatives can support the development of bridging ties as they themselves are physically situated in the neighbourhood and may lead to serendipitous development of social networks: "…by linking virtual communities of interest to physical communities, new public spaces are created and opportunities for interaction between members are increased." (Blanchard and Horan 2000). Ferlander (2003) found that a community internet café strengthened weak ties enabling the bridging between different groups within a multiethnic and deprived neighbourhood in Stockholm through its role as a meeting place for different groups interested in the Internet and utilising the physical space itself. Turner and Pinkett have also investigated the use of community ICT initiatives to empower low income communities, involving local residents in asset mapping activities to explicitly identify community resources and then input this data into community databases (Turner and Pinkett 2000; Pinkett 2002). In the Camfields Estate community ICT initiative, (Pinkett 2003) noted that participating residents who received training, internet access and computers had both

reinforced their social networks and developed new social ties, and become better informed about local community resources, for example awareness of community projects and local council facilities.

Community ICT initiatives can therefore be seen to help strengthen or possibly even initiate weak ties, developing bridging social capital within a community. However it must be noted that the removal of a community network may also degrade social capital; without the medium the opportunity to maintain the ties may drop away (Haythornthwaite 2005). It is important that community ICT initiatives consider issues of sustainability if they wish to have a lasting and positive effect on community social capital.

6.5 Sustainability

Exogenous ICT initiatives have been criticised for providing only short term benefits to recipient communities (Devins, Darlow, Petrie and Burden 2003; Warschauer 2003); long term strategies are required to ensure any improvements to social capital and the quality of life of participants are maintained. In order to gather more long term data about local ICT initiatives and their effect on social capital and quality of life within communities, it will be important for funding to be made available to help sustain initiatives beyond the short term. Whilst there appears to be considerable government funding available across the EU for the implementation of community initiatives, this funding is usually short term (the Netville project mentioned above is an example – their funding was withdrawn after 3 years). The general expectation appears to be that the new community networks will somehow become self-supporting after a few years, in much the same manner as SMEs are expected to be after initial government support.

There are few examples of externally-funded community networks becoming financially self-sufficient, however one that looks encouraging is an application of the UK government's 'Wired up Communities' initiative in Alston, Cumbria, an isolated rural community on the Scottish border. Although not completely financially independent as yet, the Cybermoor project set up as a result of this government initiative has shown itself to be a thriving community network, and is conducting its own research into its effects, which it is offering as a commercial product to researchers and government agencies.

Of a list of 300 cybercafes and telecottages identified by Liff et al. in a study of UK public internet access in the late 1990s, a significant proportion indicated that future sustainability was dependent on continued public funding and a quarter were no longer functioning (Liff, Stewart and Watts 1998). Is the initiative intended as a permanent aspect of the host community or is it a temporary intervention? What happens when the funding period finishes? A terminated ICT initiative without a clear exit strategy may cause more damage to social capital than the benefits provided by the temporary increase noted during the initiative's operation. Social capital can be destroyed as well as created. Farr (2004) defines three key independent dimensions required for the establishment and sustainability of ICT initiatives:

- Financial resources
- Community empowerment and socio-economic impact
- Efficient operations and support systems

As well as setting up the initiative, funding and organisational structures must support its ongoing maintenance. Sustainability is a complex concept, and ongoing financial stability is a chief but not sole factor (Hopkins 2005). Simpson argues that establishing social sustainability is equally as important, improving social organisation and ensuring community involvement (Simpson 2002).

ICT initiatives with a limited lifespan require an exit strategy for the end of funding: the internet is awash with 'deadnets' – once active online community initiatives survived only by an unmaintained web presence. Kubicek and Wagner (2002) argue that this may be part of the generational cycles of community networks, and in many cases it may not be clear just what it is that ought to be sustained (Hopkins 2005). The manner in which an ICT initiative at the end of its lifecycle disengages from the host community may affect to what extent social capital continues to develop. A poor departure may actually damage the quality of life within the neighbourhood, leaving residents feeling disorientated or let down (Simpson 2002).

In Netville, the technology providing consortium had seen the implementation of services and provision of high speed bandwidth as a limited time period test, whereas the residents had assumed these were to be run permanently. When the consortium announced it would be terminating internet access and removing equipment, residents felt betrayed (Hampton 2003). Ironically, Hampton reports that this announcement led to the network being used to its greatest extent amongst users to organise widespread collective action. The end result was that some of the residents decided to bid to maintain the network themselves; though Hampton does not report on how successful they eventually were.

In low income communities, an ICT initiative offering low or no cost connectivity may provide the only option for getting residents connected, however they may revert once the free services have finished, and peripheral quality of life benefits may also vanish. The Computers In Homes initiative in New Zealand gave free computers and six month internet access to low income homes for a small joining fee, but Williams et al. believe that without this option, many homes would have remained unconnected, and at the end of the free period will revert to no connection (Williams, Wallace and Sligo 2005). Rogers' diffusion of innovation theory (1962) is often portrayed as a one-way process and it is important to recognize that there are 'net dropouts' (Fox 2005) as well as adopters.

The introduction of an ICT initiative can strengthen social capital within a community, developing bridging and bonding capital through strengthening cross-community networks (Simpson 2002), however it may also 'use up' as well as create social capital (Stillman 2005). ICT initiatives often depend on goodwill and volunteer support, and over exploitation of these resources may negatively impact upon a community (Simpson 2002). Sustainability of the ICT initiative itself may not be the strategic goal (Simpson, Daws and Pini 2004); it may be to facilitate awareness of digital technologies and offer training to promote private adoption of the internet, but members of the communities may suffer when it is withdrawn; often those with least social capital or other resources (Williams, Wallace and Sligo 2005). Maintaining complex funding partnerships after the key funding has been withdrawn may require careful examination of what resources can be brought in to replace the key partner, and a critical consideration of whether enough social capital in terms of voluntary or in-kind support can replace capital funding. Foth suggests that for an initiative to be sustained, the external initiators must aim to be able to gradually withdraw and make themselves progressively redundant and encourage local activists to take over (Foth 2005). However such a devolutionary approach requires local engagement or alternate resourcing: initiatives must help build local capacity and leadership and the development of social capital (Simpson 2005).

Hopkins (2005) reports on the current concerns within Atherton Gardens, a low-income, inner-city public housing estate in Melbourne, Australia to ensure the community ICT initiative continues now that the federal funding project "Network the Nation" is coming to an end. Atherton Gardens is funded by a complex partnership of public and private partners, and the project leaders are concerned to find a way of continuing the projects (which needs approximately AS$300,000 a year to function) supporting a wide range of technical and social services including 800 individual users' computers across the estate. The Atherton Gardens initiative has found a lack of engagement by members of the community that it hoped would take on the management of the network; while the rhetoric is of an exogenous initiative passing into local ownership, this may not come about to the extent required (Hopkins 2005).

Exogenous IST initiatives may be more at risk of failing after their funding has finished, by comparison grassroots initiatives, funded from within the community at much lower levels and with a higher degree of in-kind and social capital may continue indefinitely – "we never ran out of money because we had none in the first place" as the Redbricks team in Manchester suggested (Davies 2004). However these initiatives are more dependent on generating and maintaining volunteer support and the necessary social capital to make up for funding deficits. Avis also notes that smaller communities will not have the technical expertise nor the funds to support community networks (Avis 1995).

The objectives of ICT initiatives must be aligned with the goals of the host community, if they are not seen as relevant; they will wither away regardless of assets. The tensions between the goals of an exogenous ICT intervention and differing ambitions of the host community may lead to difficulties in sustaining engagement. During the lifespan of the ICT initiative, residents will decide whether or not to engage with the initiative. Rather than a technologically deterministic 'build it and they will come' model, we follow Bijker and suggest that ICT initiatives are engaged with through a process of social and technological negotiation (Bijker 1995). Carroll et al. note that potential users may choose to appropriate the technology into their lives, not appropriate, or disappropriate - reject once explored (Carroll, Howard, Vetere, Peck and Murphy 2001). In Williams Bay, Wright notes that intranet is still being explored by residents three years after its inception - "potential users … are yet to determine exactly where, or if, this system fits with the needs of their collective lifestyles" (Wright 2005). Damsgaard and Scheepers (Damsgaard and Scheepers 2000) identify three critical stages for an intranet and Wright identifies Williams Bay as struggling to reach a critical mass of users; this can be seen as an essential requirement for any grassroots ICT initiative. Grassroots ICT initiatives may also be more vulnerable because of their small scale: Jæger notes the importance of access to technical skills and support (Jæger 2001) quoting the example of a small island in Denmark where Macintosh users were left in a crisis when the single point of technical support (the local Mac dealer) moved away (Storgaard, Jæger, Manniche, Marcussen, Hansen and Johansen 1997).

External factors can make a local ICT initiative unsustainable: in the UK many grassroots initiatives were set up in the beginning of this decade because the national telecom provider would not provide broadband access to rural communities. In response, a large number of innovative initiatives were developed using a variety of technologies such as satellite downlinks, local loop unbundling, and unlicenced wireless networks. When the telecom provider changed its policy and decided to connect rural areas, some of these community networks found themselves unable to compete, resulting in the termination of a number (e.g. West Haddon and Winwick: http://www.westhaddon.net) and others struggling to compete (e.g. 3-c.coop in Hebden Bridge (3-c 2004)). It is significant to note that a number of rural networks continue to flourish, personal communications suggest that this is due to the high level of social capital held within the initiatives, and that these grassroots initiatives may better address a broader range of digital divide issues than is provided by connecting to the major telecom (Gaved and Mulholland 2005). Farr and Papandrea suggest that initiatives that are combined together into a 'cooperative network' have much better prospects for ongoing sustainability than standalone operations and it is likely that the development of this bridging capital is more likely to help support social capital within the communities (Farr and Papandrea 2004).

7 Local ICT initiatives and Quality of Life Indicators

The SOCQUIT project (Anderson, Dries, Gaved, Heres, Mooy, Stoneman and Thomas 2006) considers a broad variety of quality of life indicators and many local ICT initiatives have described their aims in terms of a number of these. Local ICT initiatives are often instigated with the belief of social improvements; not just ICT for ICT's sake but the development of technological infrastructures to benefit participants across a variety of social dimensions. As Selwyn noted (2002) the impact of ICT initiatives can be viewed in terms of how well they enable individuals to participate as part of society. In this section we examine each of the major groups and note initiatives that have sought to facilitate communities in these respects. In this section we consider the various aspects of Quality of Life described earlier.

7.1 Physical wellbeing

In 2005, the Pew Internet and American Life Report survey noted that 80% of US based Internet users had used the Internet as a source for health information with a typical user searching for at least five topics (Fox 2005). The internet has become an important source of health information for a large number of the population and government health services are increasingly being moved online (e.g. the UK's 'NHSDirect' online service http://www.nhsdirect.nhs.uk/). There are a large number of global virtual communities of interest based around support of specific medical conditions and some of these provide local support groups for face-to-face meetings. Local ICT initiatives may address health issues through portal links to health resources online or enable participants to share knowledge and support, including local warm experts that "can facilitate access and be important mediators of technical know-how and the use of search engines and databases" (Wyatt, Allison, Donoghue, Horton and Kearney 2003). Initiatives that encourage local asset mapping (Turner and Pinkett 2000; Pinkett 2003) are likely to register local health practitioners as local resources. Exogenous initiatives are more likely to act as portals to health services as they may be working in partnership with local or national health groups. This may provide a significant resource as users require localised health information; for example a US based resource may not be appropriate to a UK based user (Wyatt, Henwood, Hart and Smith 2005).

ICT initiatives using technologies other than personal computers may also provide health services to the local community and improve the quality of life as a result. 'Smart homes' integrating sensor devices may provide monitoring for at-risk residents: for example the UK INTEGER project refurbished a high rise tower block, Glastonbury House in London (http://www.integerproject.co.uk/westminster.html) to include sensors monitoring water and electricity usage by its elderly residents. This is supported by care wardens and any abnormal usage of the services can automatically raise an alarm that will prompt a house visit to check all is well. CCTV cameras may be implemented as part of a local ICT initiative (Webster and Hood 2001); increasingly these can be controlled via residents as well as in a central control centre and are becoming more integrated within a wider range of tools, providing a greater degree of personal safety for residents. These may be accessed either through a private intranet or, as in the case of Glastonbury House, through a spare channel on the residents own televisions fed through a central cabling system.

7.2 Social wellbeing[4]

Many local ICT initiatives based on communitarian concepts with the intention of enhancing social wellbeing in communities and the tools provided often focus on improving this aspect of participants lives. Despite

[4] Much that could be said here has already been discussed in the previous sections on social capital.

earlier concerns that ubiquitous internet access would lead to isolation and social withdrawal (Kraut, Patterson, Lundmark, Kiesler, Mukhopadhyay and Scherlis 1998) more recent studies have pointed to users integrating ICT within their wider means of communicating with friends and family and making new ties. By providing an additional communications medium more interaction is possible – 'latent ties' are created that can later be realised (Haythornthwaite 2005). As has been noted previously in an earlier section, Hampton and Wellman report that networked residents in Netville "recognized three times as many, talked with twice as many, and visited 50 percent more of their neighbors in comparison to their non-wired counterparts" (Hampton and Wellman 2003). Hampton and Wellman suggest that ICT helps maintain 'just out of reach' relationships best, with contacts between 50 – 500 kms away (Hampton and Wellman 2001).

Local ICT initiatives can provide the tools to help maintain relationships between face to face meetings and maintain community interactions; often these are simple tools that users may already be familiar with through their workplaces such as email, mailing lists, instant messaging and web based fora. The Manchester grassroots network 'Redbricks' for example has experimented with a range of tools but found two mailing lists suffice to support most interactions – 'Act' for political activity and 'Shout' for a general call for community help (Gaved 2003). Community groups may utilise tools provided by ICT initiatives to help with particular groups within a local neighbourhood; for example to enable immigrant families to keep in contact with relatives in another country, to collecting oral histories from older residents, or to promote local activities (Williams 2005).

7.3 Development and activity

Local ICT initiatives have the possibilities of enabling participants to engage in political and economic activity both within and beyond their communities. Exogenous initiatives tend to focus on formal methods, with portals providing links to external agencies. For example the UK Government is increasingly moving information online and ICT initiatives may provide links to local representatives. Grassroots initiatives tend to be more concerned with community activism, such as the Redbricks mailing lists already noted, bringing community members together to improve their local situation. The Wired up Communities initiative found that 15% of participants used the internet access to find out about political groups, though only 5% sent information (Devins, Darlow, Petrie and Burden 2003). Job seeking is a popular use of ICT access, and learning new skills towards that objective: the Wired up Communities initiative found 45% of participants had used the internet to find work and Maxwell found that UK Online Centres are used as pathway to gain new skills (Maxwell 2005). Informal sharing of housework tasks might be supported via a local initiative; in Netville, Hampton found babysitting was shared, and teenagers sought local jobs through the community network (Hampton 2003). ICT initiatives based in specific localities such as community centres or local libraries often run training and skills courses and self-education is a major motivator for community usage (Blanchard and Horan 2000). Grassroots initiatives focus less on formal training and more on informal support amongst users, with tools skewed more towards leisure and hobby activities such as sharing music, and internet gaming. The use of local ICT initiatives to support leisure activities is not restricted to the young who are "digital natives" (Williams 2005) but also older residents who might have more leisure time available. Brabazon (Brabazon 2005) notes that while the proportion of older people using ICT remains lower than other age groups, it is increasing, and combined with more positive societal attitudes towards ageing, means an increase in 'silver surfers'.

7.4 Emotional wellbeing

ICT initiatives may support the development of strong and weak ties, helping to increase the emotional wellbeing within a neighbourhood. While local ICT initiatives may not in themselves enhance emotional wellbeing, the provision of a communication channel and associated tools allows for greater interactivity between participants and the potential to develop trust within the community. In the Blacksburg Electronic Village, community groups and local faith groups have been active participants, providing local content and helping develop bridges between different sections of the community (Cohill 2001). Schuler noted the use of community networks in the USA to support shared parenting groups (Schuler 1994) and Hampton found that the ICT tools in Netville were often used for babysitting; residents were able to support trusted relationships through the network.

The SOCQUIT model of quality of life indicator refers to self-esteem and fulfilment, and local initiatives may support this through the development of ICT skills and self-education gained through use of ICT. For some members of the community this may give them their first opportunity to access computers and the internet and gain confidence in using technology as a result.

7.5 Material wellbeing

Neighbourhood improvement is a very general aspiration of all local ICT initiatives, including increasing the material wellbeing of the community itself (Hopkins 2005). In existing neighbourhoods this can take the form of enabling residents to improve their local environment, for example highlighting illegal dumping of rubbish or graffiti (Williams 2005) or the use of CCTV to reduce the risk of crime (Webster and Hood 2001). New built communities may use ICT initiatives to improve their locality through negotiation with the building contractors to sort out 'snagging problems' with houses (Hampton 2003) or to query changes in plans (Wright 2005). More fundamentally an ICT initiative can help participants find housing: the Glasgow City Council has recently been given funding to open three internet cafes in hostels for the homeless. Residents are provided with a peripatetic tutor offering ICT training courses, and helped with setting up email accounts and sourcing information on local services such as health care, education and housing (Maxwell 2005). Local business may benefit from being able to promote their services through the ICT initiative, and benefit from better access to internet connectivity; Carroll noted that local businesses were enthusiastic users of the Blacksburg Electronic Village network, with 25% signed up in 1996 (Carroll and Rosson 1996).

8 Long Term Effects

There is little research on the long term effects of local ICT initiatives on social capital or quality of life indicators, mostly due to the relative novelty of the field. Rapid technological improvements and the changing levels of penetration of ICTs into society make comparisons difficult. Haythornthwaite notes that "in considering the integration of the Internet into our daily lives, we also need to remember that, as many point out, the Internet is a new social phenomenon that has been in place for fewer than 11 years. We already see that experience and time online changes behaviour; we are watching an emerging phenomenon, not a mature one" (Haythornthwaite 2001). Loader and Keeble (1994) note:

"The extent and robustness of current empirical research in community informatics is not sufficient to help policy makers and practitioners to design and implement effective strategies and actions"(http://www.jrf.org.uk/knowledge/findings/socialpolicy/584.asp)

There are a small number of initiatives that have collected data over a long term: chief amongst these is the Blacksburg Electronic Village, which has been reported from 1993 to the present. Like the HomeNet project, the social and technological environment in which the initiative was envisaged was quite different to today (December 2005) – it was 'the only game in town' and people's expectations and access to equipment was quite different. Many earlier initiatives were based on providing dial-up access via a modem, at much high prices than today's always-on ADSL connections operating at much faster speeds. For example, 20% of the HomeNet trial had never used a computer before (Kraut, Scherlis, Mukhopadhyay, Manning and Kiesler 1996), and the Wired up Communities project could still connect some trial communities with dial-up connections in 2002 (Devins, Darlow, Petrie and Burden 2003). ICT initiatives may be the first experience communities have of internet access and may pave the way for broader take up; if the community initiative is successful commercial providers may step in, in some cases rendering the community initiative obsolete (e.g. rural broadband provision in the UK). Comparisons over long periods of time may still prove difficult until the phenomenon 'matures' and effects will change over time (Kraut and Kiesler 2003): for example Kraut et al. (1998) initially found internet access had negative social effects (a decline in social circle and communication with family, increased loneliness and depression) but these dissipated in the longer term (Kraut, Kiesler, Boneva, Cummings, Helgeson and Crawford 2002). Part of this may have been due to the treatment of the novel medium as distinct from other social interaction: early research into ICTs and their social impact "tended to assume that Internet use was somehow separate from people's lives" (Otis and Johanson 2004) with researchers such as Pigg suggesting "the adaptation of electronic telecommunications in community networking represents the most direct challenge yet to the role of 'place' in our understanding and development of community (Pigg 2001). However, use of ICT is normalising as one part of the rich 'media ecology' which we use to sustain relationships, and some researchers see participants "reverting to type" (Haythornthwaite 2001).

Initial research offered novel experiences and were utilised by 'early adaptors' whereas now we see a broader range of users and use. Wellman wonders if the positive impact of Internet on community ties shown in 'Netville' may be a special case because the residents were recent arrivals and enthusiastic about participating in an Internet experiment (Wellman and Hampton 1999). Kavanaugh suggests that in the long term, "Internet access will have only a modest effect on community involvement and civic engagement in geographic communities, and will be limited to those individuals (early adopters) with higher levels of education and social status, who have traditionally been more actively involved in their local communities" (Kavanaugh 2001). Later adaptors may use ICTs in very different ways, and as people have longer term

access, their usage may evolve: “the longer people are users of the Internet, the more likely they are to use the Internet for a variety of social-capital building activities” (Kavanaugh and Patterson 2001). Despite Kavanaugh’s pessimistic predictions about the long term effects of community ICTs, in the former Wired up Community of Alston Moor, residents are showing a depth of internet use beyond shopping and commercial services. The ‘early adopters’ were responsible for setting up a lift-sharing scheme accessible online, a local skills directory and a discussion board for matters concerning the community, amongst other services. The early adopters in Alston appeared to be those people who were already involved in community activities and who were motivated to improve life for local people.

Two years after implementation, concerted efforts were made to encourage other sections of the community to go online, including older residents and the unemployed, that is, the so-called ‘late adopters’. Partly as a result of these initiatives, the older population in Alston has a range of internet use way above the national average, and these users are accessing a broad range of services, particularly those to do with education and the local community. Online lifelong learning services are proving extremely popular here, as well as online medical information and online access to local information.

It is still contested whether local ICT initiatives can build social capital; Pigg argues that “there is little evidence that … the nature and extent of information access and communication are yet capable of producing social capital or building community (Pigg 2001) and Putnam suggests that experience in Blacksburg Electronic Village suggests that “social capital may turn out to be a prerequisite for, rather than a consequence of, effective computer-mediated communication” (Putnam 2000). Other researchers are more optimistic; Haythornthwaite suggests ICTs help create latent ties within groups (2002) that can then be realised as social contacts when a community need has to be satisfied.

Another source of information on long term effects is a study conducted in Israel . This study examined the structure and content of two electronic mailing lists set up in 1995 (with no help from external funding sources) in two communities near Jerusalem (Ramat Beit-Shemesh and Modiin), using web-based survey methods (total n = 153 (38%)). Their findings showed that although the lists appeared to make no difference to social relations in the immediate neighbourhood, they clearly aided communication with the wider community. Initial contact through the lists led, as expected, to increased face-to-face and phone contact in both communities. The researchers identified four main types of mailing list use; these were (in order of frequency of posting) information seeking (with information about local cultural events being the most widely sought), household help (arranging lifts and lift-sharing being the most popular activity), shopping and consumption (tips on sales being the most frequent type of posting) and expressing opinions (on wider neighbourhood and local community issues equally). The fact that no respondent had been a member of the mailing lists for longer than four years shows that these could be typical activities of late adopters, and can therefore be said to be representative of long term use of community ICT provision. However, certain cultural aspects must also be taken into consideration. The E-Living project demonstrated the importance of community life in Israel, with relationships scoring high in importance on comparative measures of quality of life. As Mesch and Levanon state:

“..The situation seems to differ in Israel as social involvement with neighbours is high and residents define the neighbourhood as a territory that is the basis for the development of neighbourly relations of reciprocal help and support” (p.349).

Nonetheless, the continued existence of the lists over a ten year period is in itself a fact worthy of consideration, and it suggests that local ICT initiatives may provide long term benefits to communities, developing social capital across a wider range of participants.

It is likely that data on the long term effects of ICT initiatives will grow as time progresses and penetration grows; at the moment it is difficult to take a long view because of the rapidly changing environment; as Kraut and Kiesler note of their research developed from the HomeNet initiatives: “we believe that a major reason for some changes in our findings over time is that the Internet, the purposes for which it is used, and norms surrounding use are co-evolving.” (Kraut and Kiesler 2003).

9 Summary

ICT initiatives support community development of social capital; however some researchers still question whether social capital needs to be in place already for it to be built further. ICT initiatives can support a broad range of quality of life indicators. Sustainability is an issue; exogenous initiatives need to have an exit strategy and be aware of the effect they may have if they leave. Grassroots initiatives may be more sustainable, as they are supported from within the community usually on a financially self-sustaining model,

but need to ensure a sustainable social model as they draw heavily on the community's social capital, which can be spent as well as accrued through the maintenance of the initiative.

Communities appropriate ICT initiatives to their own purposes and whilst short term effects are often measured, however longer terms are uncertain; the internet is changing rapidly and little research has followed up initiatives after their funding has terminated.

There is a concern that ICT initiatives may lead to "rich getting richer" with those already rich in social capital benefiting the most (Kraut, Kiesler, Boneva, Cummings, Helgeson and Crawford 2002). Thus ICT initiatives in communities where there is already a high level of social capital are most likely to succeed. It is still an open question as to how to benefit less well connected communities. More experimentation and action research is needed.

We have seen that low bridging capital is problematic. There is a need to help develop links between individuals and communities to resolve ICT problems when resources of community are stretched. Smaller communities will not have the technical expertise nor the funds to support community networks (Avis 1995). Cooperative collaborations need to be supported (Farr and Papandrea 2004).

Finally, it is important to remember that it is the stage in the lifecycle of the community at which data is gathered that will determine how successful the community appears to be. It is recommended that data be collected over a minimum of 5 years, possibly longer, to allow us to fully understand the impact of community networks. The different characteristics of early and late adopters will always influence the data collected.

Based on these overall conclusions we offer the following recommendations:

1. Policy initiatives should be oriented towards grassroots actions and to provision via social enterprises. Sustainability should be encouraged through committed long term (5-10 years) low-level funding.
2. Collaborations between grassroots initiatives should be encouraged and actions (such as financial support) to help exchange of knowledge and experience through setting up / support of associations, collaborative groups should be taken.
3. There should be an explicit strategy to transfer from Government/NGO 'provision' to community self-provision and ownership during the lifetime of any given initiative.
4. Funding agencies should consider providing support for the development of strong linking types of social capital, as this is what appears to create the most resiliency within communities.
5. Development of local ICT initiatives may consider first developing or assuring the presence of social capital within communities before the introduction of technology.
6. Home access is preferred over local (e.g. telecentre) access this should be the aim of local ICT initiatives. Telecentres provide a "third place" and valuable to encourage bridging capital, support and training, but usage of public access facilities may be limited by social and cultural factors.
7. "Technological capital" is required (Selwyn 2002). Technological capital allows individuals to produce their own cultural products as well as being consumers, leading to increased social capital. Initiatives should consider very carefully how they can provide this kind of capital.
8. Initiatives need to go up the citizens' value chain – they need to consider what the community purposes are – not a problem to put technological devices or conduits into a community but if they do not address a community's purposes they will not be used. We can use Gaved and Mulholland's layered model to make this clear (2004).

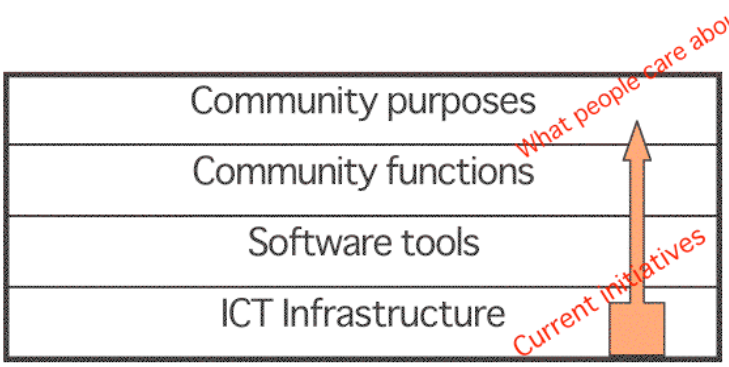

Figure 5: The citizen's value chain and the role of local ICT initiatives (after (Gaved and Mulholland 2004))

9. Tools and frameworks for self-production of content and services as well as for the self-reproduction of community should be created and supported to enable citizens to build the content and services they want not the ones 'we' think they should have.
10. To instigate a systematic programme of follow-up research on existing or recent initiatives to assess their social impact.
11. For all new EU/Govt funded initiatives to insist as a condition of funding on the implementation of longer-term (> 4-5 years) multi-method studies of their social impact.
12. To make research an attractive proposition for grassroots initiatives –often research is something that is seen as getting in the way of the real work and outside researchers are seen as an amusing distraction at best and often viewed with caution and scepticism "entertaining, but not useful" (Cae from Redbricks, quoted in Skyva (Skyva 2002). Yohe suggests "While academics are indeed a part of the community, it is generally the case that the community as a whole regards the academics with some degree of suspicion or even antipathy" (Yohe 1996). Or as Pete from Redbricks put it succinctly to Skyva: "Personally, like the stone age tribe in New Guinea, I feel I am suffering from research fatigue" (Skyva 2002) . These issues must be addressed in a sensitive yet rigorous way.

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